

WHAT IS CLAIMED IS:

1. A golf ball comprising a core, a cover and at least one intermediate layer therebetween, wherein the intermediate layer is comprised of nanostructures dispersed in a polymeric matrix.
- 5 2. The golf ball of claim 1, wherein the nanostructures are altered.
3. The golf ball of claim 2, wherein the nanostructures are comprised of layered planes of graphite.
- 10 4. The golf ball of claim 3, wherein the graphite is exfoliated.
5. The golf ball of claim 4, wherein the graphite is exfoliated by an exposure to a temperature higher than 700°C.
- 15 6. The golf ball of claim 3, wherein the graphite is intercalated by immersion in a solution containing an oxidizing agent.
- 20 7. The golf ball of claim 6, wherein the oxidizing agent is selected from a group consisting of nitric acid, potassium chlorate, chromic acid, potassium permanganate, potassium chromate, potassium dichromate, perchloric acid, and mixtures thereof.
8. The golf ball of claim 6, wherein said solution comprises sulfuric acid, and the oxidizing agent is selected from a group consisting of nitric acid, perchloric acid, chromic acid, potassium permanganate, sodium nitrate, hydrogen peroxide, iodic and periodic acids.
- 25 9. The golf ball of claim 6, wherein the amount of solution is about 10 to 150 parts to 100 parts of graphite.
10. The golf ball of claim 3, wherein the graphite is intercalated by exposure to a halogen.

11. The golf ball of claim 10, wherein the halogen is in solution with sulfuric acid.
 12. The golf ball of claim 3, wherein the graphite is intercalated by exposure to a metal halide.
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13. The golf ball of claim 12, wherein the metal halide is in solution with sulfuric acid.
 14. The golf ball of claim 2, wherein the nanostructure is compressed into foil.

- 10 15. The golf ball of claim 1, wherein the polymeric matrix is selected from the group consisting of natural rubber, styrene-butadiene rubber, styrene-propylene or ethylene-diene block copolymer rubber, polyisoprene, polybutadiene, copolymers comprising ethylene or propylene, as ethylene-propylene rubber (EPR), ethylene-propylene diene monomer (EPDM) elastomer, copolymers of acrylonitrile, diene elastomers, polychloroprene, chloroprene copolymers, butyl rubber, halogenated butyl rubber, polysulfide rubber, and silicone polymers.
- 15 16. The golf ball of claim 1, wherein the polymeric matrix is selected from a group consisting of polyethylene, polypropylene, acrylic polymers, methacrylic polymers, polymethyl methacrylate, polystyrene, polyepoxides, polymers comprising an epoxy moiety, phenol-formaldehydes, polyamides, polyesters, polyvinyl chlorides, polycarbonates, polyacetals, polytetrafluoroethylene, polyvinylidene fluoride, polyurethanes, copolymers of acrylic, copolymers of methacrylic, blends of acrylic polymers, blends of methacrylic polymers, partially neutralized ionomers, fully neutralized ionomers, polybutylene, copolymers comprising one or more olefins, polyethylene acrylic acid copolymers, polyethylene methacrylic acid copolymers, terpolymers of ethylene, a softening acrylate class ester, and a carboxylic acid, polyethylene ethyl acrylate, polyethylene methyl acrylate, polyethylene vinyl acetate, polyethylene glycidyl alkyl acrylates, metallocene catalyzed polyolefins, polyesters, polyamides, non-ionomeric thermoplastic elastomers, copolyether-esters, copolyether-amides, thermoplastic polyurethanes, thermosetting polyurethanes, polyureas, polyurethane ionomers, epoxies, polycarbonates, polybutadiene, polyisoprene, and blends thereof.

17. The golf ball of claim 1, wherein the intermediate layer is a water vapor barrier layer.
18. A golf ball comprising a core, a cover and a water vapor barrier layer, wherein said water vapor barrier layer comprises graphite foil.
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19. The golf ball of claim 18, wherein graphite foil is compressed exfoliated graphite and has a thickness of about 0.1 to 600 mils.
- 10 20. The golf ball of claim 18, wherein the graphite foil includes a polymeric binder.
21. The golf ball of claim 20, wherein the polymeric binder is a thermosetting material.
22. The golf ball of claim 20, wherein the polymeric binder is a thermoplastic material.

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